

Space Network Access System (SNAS) System Requirements Document

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Original

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Initiated by:

E. Joseph Stevens SNAS Product Manager Code 565, Electrical Systems Branch	Date
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Approved by:

Keiji K. Tasaki Project Manager Code 452, Space Network Project	Date
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**Goddard Space Flight Center
Greenbelt, Maryland**

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Preface

The purpose of this document is to provide the requirements for the Space Network Access System (SNAS).

This document is under the configuration management of the Goddard Space Flight Center (GSFC) Mission Services Program (MSP) Space Network (SN) Project (Code 452) Configuration Control Board (CCB). Configuration Change Requests (CCRs) to this document shall be submitted to the SN Project CCB, along with supportive material justifying the proposed change. Changes to this document shall be made by document change notice (DCN) or by complete revision.

Direct all comments, questions, or suggestions regarding this document to:

SNAS Product Design Lead
Code 452, Space Network Project
Goddard Space Flight Center
Greenbelt, Maryland 20771

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SECTION 1. INTRODUCTION

1.1 PURPOSE

This requirements document presents the functional, performance, and interface requirements for the Space Network Access System (SNAS). The SNAS provides Space Network (SN) customers with a network interface to the Network Control Center Data System (NCCDS), located in the Data Services Management Center (DSMC), or the Demand Access System (DAS) for the purpose of planning, scheduling, monitoring, and controlling SN services.

Among the systems currently available to SN customers for scheduling are the User Planning System (UPS) and the SN Web Services Interface (SWSI). The UPS offers a full set of features and tools for non-DAS SN customers. The SWSI was designed to provide a simple low-cost network-based option for SN customers who want the quick turn-around scheduling flexibility. The SWSI provides the functionality required for DAS customers as well as basic scheduling functions for all SN services. Some customers have developed unique SN interface systems for use by their individual missions.

SNAS is intended to be capable of supporting all SN customers by providing a network-based system that incorporates features from the UPS, SWSI, and other SN customer-required functionality. Customers will be able to schedule SN support just prior to the requested period and also have support tools to ease in scheduling for long-term planning.

1.2 SCOPE

This document addresses the operational, functional, performance, interface, and maintenance requirements for SNAS. In addition, the requirements for SNAS operations, maintenance, and security are specified. To the extent possible, consistent with implementation cost and schedule risk, as well as operations and logistics costs, the requirements do not define specific implementation approaches.

1.3 BACKGROUND

The interface between an SN customer Mission Operations Center (MOC) and the NCCDS consist of electronically exchanged formatted messages. Customers have traditionally had a limited number of options for implementing this interface. A full-featured SN scheduling tool for Single Access (SA) and Multiple Access (MA) services is provided by the UPS, which runs on a Hewlett-Packard (HP) Unix host. This option requires the customer to purchase a complete system at a significant cost or a customer interface with an institutional UPS located within the Goddard Space Flight Center (GSFC) Multi-satellite Operations Control Center (MSOCC). A National Aeronautics and Space Administration (NASA) Integrated Services Network (NISN) Closed Internet Protocol (IP) Operational Network (IONet) connection is required for the latter

option. The UPS project is not slated to receive any additional funding for upgrades and/or maintenance.

The DAS allows an increased number of customers to utilize the SN's Multiple Access Return (MAR) service, therefore scheduling with a significantly reduced lead-time. The UPS system does not allow customers to schedule this service. SWSI, a network-based cross-platform customer interface to the NCCDS, provides customers with an interface to the DAS. SWSI is accessible via a desktop computer or workstation, and provides access either from the NISN Closed IONet or the NISN Open IONet. Since the Open IONet allows access from other networks such as the NASA Science Internet and from the public Internet, SWSI is accessible by NASA's university, enterprise, and inter/intra-agency partners.

SNAS brings together the most useful features of the UPS along with the real-time features and DAS functionality of SWSI, thus rendering both systems obsolete. The network portion of SNAS will be installed and operated within the DSMC. The SNAS is intended to be the single SN access system offered to potential and existing SN customers as the standard interface to obtain and control SN services. Existing customers with unique SN interface systems, however, will not be precluded from continuing to use their current systems.

SECTION 2. DOCUMENTS

2.1 APPLICABLE DOCUMENTS

The following documents are part of this specification to the extent cited therein. The most recent version of these documents takes precedence. If there are conflicts between the listed documents and the requirements of this specification, the requirements of this specification take precedence. If no section number is shown, the whole document applies.

<u>Document Number</u>	<u>Document Title</u>
a. NPR 2810.1	<u>NASA Procedural Requirements for Security of Information Technology</u>
b. GPG 2810.1	<u>GSFC Security of Information Technology</u>
c. NPR 8715.3	<u>NASA Safety Manual</u>
d. 452-ICD-SN/CSM	<u>Interface Control Document between the Space Network and Customers for Service Management</u>
e. 452-ICD-DAS/SNAS	<u>Interface Control Document Between the Demand Access System and the Space Network Access System</u>
f. CSOC-CEN.SE11.001070	<u>Data Services Management Center (DSMC) System Requirements Specification for the Network Control Center Data System (NCCDS)</u>
g. CSOC-GSFC-TEST-000924	<u>Network Systems Integration & Analysis Master Test Plan for Network Control Center Data Systems</u>
h. 290-003	<u>IP Operation Network (IONet) Security Plan</u>
i. N/A	<u>NISN Project Security Plan</u>
j. 450-SNUG	<u>Space Network (SN) User's Guide</u>
k. NPD 2820.1	<u>NASA Software Policies</u>

<u>Document Number</u>	<u>Document Title</u>
l. N/A	<u>The JavaTM Virtual Machine Specification</u> (http://java.sun.com/docs/books/vmspec/2nd-edition/html/VMSpecTOC.Cod.html)
m. 290-004	<u>Internet Protocol Operational Network (IONet) Access Protection Policy and Requirements</u>

2.2 REFERENCE DOCUMENTS

The following documents are for reference only. They provide insight into the operation, characteristics, and interfaces of the TDRSS. The most recent version of these documents takes precedence.

<u>Document Number</u>	<u>Document Title</u>
a. 511-4SRD/0196	<u>Network Control Center (NCC) User Planning System (UPS) System Requirements Specification, 1998</u>
b. 453-SRD-SWSI	<u>Space Network (SN) Web Services Interface (SWSI) System Requirements, 2001</u>
c. 514-4SRD/0389	<u>Network Control Center (NCC) User Planning System (UPS) System Requirements Document, Revision 2, October 1994</u>
d. 514-4ICD/0290	<u>Interface Control Document Between the Network Control Center (NCC) User Planning System (UPS) and the Electronic User, May 1992</u>
e. 553-FDD-91/028	<u>Flight Dynamics Division (FDD) Generic Product Formats Interface Control Document, June 1991</u>
f. 452-UGD-UPS	<u>Space Network User Planning System (UPS) User's Guide</u>
g. 514-4DBD/0290	<u>Network Control Center (NCC) User Planning System (UPS) Database Design Document, Revision 5, May 1994</u>

SECTION 3. REFERENCE ARCHITECTURE

3.1 REFERENCE ARCHITECTURE

Figure 3-1 depicts the SNAS reference architecture. The figure and following description serves only to facilitate discussion of SNAS. The architecture, as shown, is not a requirement. However some basic assumptions underlying the SNAS reference architecture do effectively dictate portions of the SNAS implementation. These assumptions are summarized as follows:

- a. The SNAS must include a server on both the Open IONet and the Closed IONet. SNAS clients on the Open IONet and the Internet provide services indirectly to the SNAS servers on Closed IONet via the SNAS servers on Open IONet.
- b. The SNAS's RMA requirements cannot be satisfied without providing prime and backup servers.

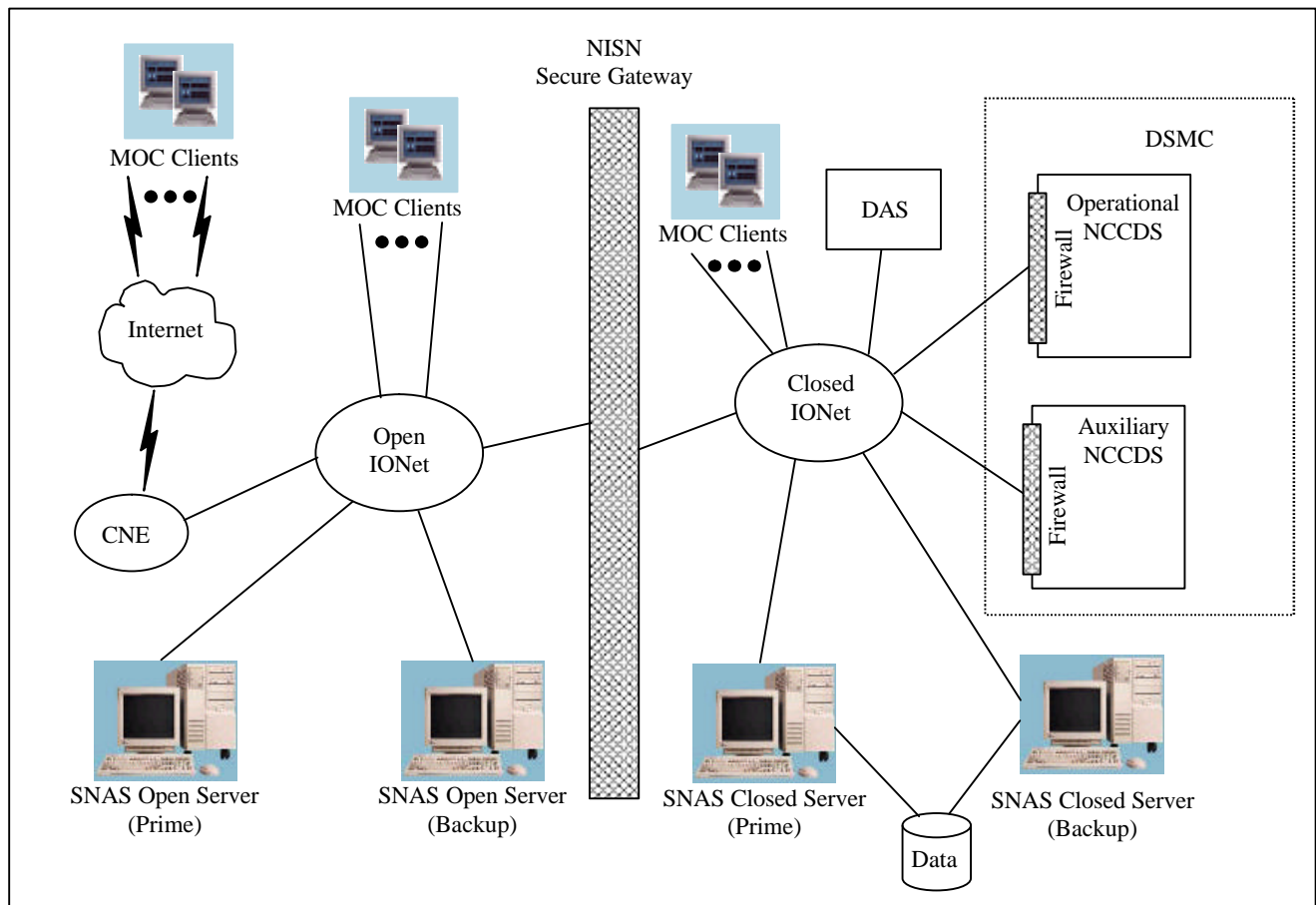


Figure 3-1. SNAS Reference Architecture

3.2 SNAS REFERENCE ARCHITECTURE DESCRIPTIONS

3.2.1 Client

Depicted in the reference architecture, Figure 3-1, as MOCs, the SNAS client workstation is the platform provided by the customer, and includes the hardware and software infrastructure necessary to host the client software. The client software provides customers with access to the SN via the Open or Closed SNAS servers. The client software is considered part of the SNAS product.

3.2.2 Servers

The servers will act as proxies to route requests from the client to the NCCDS and/or the DAS and return responses to the client, establishing and maintaining all the Transmission Control Protocol (TCP) requirements for the connections. Traffic between the servers on the Open and Closed IONet passes through the NISN gateway.

3.2.3 Database

The SNAS database will operate as a shared database to the backend server(s) on the closed side of the NISN Secure Gateway. Database tables will hold static data, semi-static data and dynamically updated data. The static tables will store data that is rarely changed like Tracking and Data Relay Satellite (TDRS) names, Spacecraft Identification Code (SIC) and Support Identifier (SUPIDEN) values. The data in the static table will be used for building display panels and for processing DSMC or DAS messages. SNAS customers will be assigned access privileges depending upon their roles.

SECTION 4. SYSTEM REQUIREMENTS

The purpose of the SNAS is to provide SN users with an interface allowing access to SN scheduling and monitoring. This system will replace the previous UPS and SWSI systems.

4.1 FUNCTIONAL REQUIREMENTS

This section presents the SNAS requirements for functionality in the following areas: system functions, client functions, DSMC interactions, DAS interactions, database management, and system logging.

4.1.1 System Functions

The requirements stated in this section are high-level, system-wide requirements. Specific functions may operationally limited based on access level.

- 4.1.1.1 The SNAS shall meet the guidelines set forth in NPD 2820.1, NASA Software Policies.
- 4.1.1.2 The SNAS shall adhere to NASA and GSFC policies, guidelines, and procedures relating to Section 508 Compliance.
- 4.1.1.3 The SNAS shall ensure that customers are only able to access messages and data for which they are authorized.
- 4.1.1.4 The SNAS shall provide an interactive SN interface for scheduling, real-time monitoring and real-time control during active events.
- 4.1.1.5 The SNAS shall provide reporting capabilities including reports of requested events, confirmed active schedules, and activity logs.
- 4.1.1.6 The SNAS shall provide the capability to create, update and display data in the system database.
- 4.1.1.7 The SNAS shall support multiple local or remote connections to the NCCDS and DAS.
- 4.1.1.8 The SNAS shall provide simultaneous access to both the operational NCCDS and the Auxiliary NCCDS for performing Engineering Interface (EIF) testing.
- 4.1.1.9 The SNAS shall supply a High Availability (HA) configuration to adhere to existing NCCDS RMA requirements.

- 4.1.1.10 The SNAS shall provide operation and maintenance of the system at multiple levels of access including: system administrator, the mission manager, and the mission customer.
- 4.1.1.11 The SNAS shall provide programmatic access points (“hooks”) at major interfaces and operational phases.

4.1.2 Client Functions

- 4.1.2.1 The Graphical User Interface (GUI) for the SNAS shall provide customers the ability to view, manipulate, and edit scheduling information as follows:
 - 4.1.2.1.1 The GUI shall be capable of displaying both graphical and textual information.
 - 4.1.2.1.2 The graphical and textual displays shall be able to be displayed individually or simultaneously.
 - 4.1.2.1.3 The displays shall be able to depict information about legacy (SA and MA) NCCDS service as well as DAS service, individually or simultaneously.
 - 4.1.2.1.4 The textual display shall include scroll lists, radio buttons, text entry boxes, and text entry fields, where appropriate.
 - 4.1.2.1.5 The graphical display shall present information in horizontal timelines with the earlier time at the left of the timeline and the later time to the right of the timeline.
 - 4.1.2.1.6 Graphical timeline displays shall be able to display the following:
 - 4.1.2.1.6.a Schedule requests
 - 4.1.2.1.6.b TSWs
 - 4.1.2.1.6.c TDRS view/orbital constraints
 - 4.1.2.1.6.d User specified TDRSS resource constraints
 - 4.1.2.1.6.e User specified orbital constraints, including day/night portions of the customer platform’s orbit
 - 4.1.2.1.7 Timelines shall be configurable such that related information (e.g., SARs and TSWs) are displayed together
 - 4.1.2.1.8 Timelines shall be configurable such that the customer may select:
 - 4.1.2.1.8.a One or more timeline(s) for each user selected TDRS (or TDRS Set) and SIC pair

- 4.1.2.1.8.b One or more timeline(s) for a user selected SIC and all selected TDRS and/or TDRS Sets
- 4.1.2.1.8.c One or more timeline(s) for a user selected TDRS or TDRS Set and all selected SICs
- 4.1.2.1.9 The graphical display shall be capable of presenting timelines for at least 5 TDRS's or TDRS Set's simultaneously within a single viewable area.
- 4.1.2.2 The SNAS shall provide the following system validation:
 - 4.1.2.2.1 TDRS View/Orbital Constraint Checking:
 - 4.1.2.2.1.a The SNAS shall verify the visibility between TDRS and the customer platform using the TDRSS Scheduling Windows (TSWs).
 - 4.1.2.2.1.b The SNAS shall verify the validity of the customer communication contacts using the TSWs.
 - 4.1.2.2.2 Parameter Verification:
 - 4.1.2.2.2.a The SNAS shall perform data type validation and boundary checking.
 - 4.1.2.2.2.b The SNAS shall perform basic validation to ensure that all required fields have been entered.
 - 4.1.2.2.2.c The SNAS shall perform crossfield verification to ensure that the service parameters within each service are consistent with the validation rules as specified in 452-ICD-SN/CSM.
 - 4.1.2.2.2.d The SNAS shall perform constraint verification to ensure that the service parameters among each service in a Schedule Add Request (SAR), Alternate SAR (ASAR), and Replacement Request (RR) are consistent with the validation rules as specified in 452-ICD-SN/CSM.
- 4.1.2.3 The SNAS client system shall provide the following messaging and control functions:
 - 4.1.2.3.1 Store Return Channel Time Delay Messages (RCTDM) and Time Transfer Messages (TTM) received from the NCCDS in binary files on the customer workstation for later processing by customer applications.
 - 4.1.2.3.2 Provide a means to view alerts or messages when operational abnormalities are detected in SN Scheduling Function resources.
 - 4.1.2.3.3 Send an error message and allow the customer to correct the error and continue upon detection of an error during verification and validation of the schedule request.

- 4.1.2.3.4 Notification to the customer when a schedule request has been successfully created.
- 4.1.2.4 Vector Storage and Transmission
- The SNAS will provide the following vector storage and transmission capabilities:
- 4.1.2.4.1 Based on the customer's login information, the SNAS shall provide the customer with the capability to select the SIC to be used in vectors from a list of SICs for which the customer is authorized.
- 4.1.2.4.2 The SNAS shall provide the customer with the capability to enter the latitude, longitude, and altitude of a customer spacecraft.
- 4.1.2.4.3 The SNAS shall provide the customer with the capability to enter the Cartesian position and velocity of a customer spacecraft.
- 4.1.2.4.4 The SNAS shall be capable of converting a customer-entered set of latitude, longitude, and altitude or Cartesian position and velocity data for a customer spacecraft into a type 8 (stationary) Improved Interrange Vector (IIRV) for that spacecraft.
- 4.1.2.4.5 The SNAS shall be capable of converting a customer-entered set of latitude, longitude, and altitude or Cartesian position and velocity data for a customer spacecraft into a type 1 (orbital) IIRV for that spacecraft.
- 4.1.2.4.6 The SNAS shall provide the customer with the capability to directly enter IIRVs.
- 4.1.2.4.7 The SNAS shall provide the customer with the capability to store/view generated IIRVs.
- 4.1.2.4.8 The SNAS shall provide the customer with the capability to import files of IIRVs manually and/or automatically and forward them to NCCDS and/or DAS, depending on which system(s) is used to support that customer platform.
- 4.1.2.4.9 The SNAS shall provide the customer with the capability to select one or more IIRVs for transmission to the NCCDS/DAS.
- 4.1.2.4.10 The SNAS shall provide the customer with the capability to display and retransmit previously transmitted IIRVs.
- 4.1.2.5 The SNAS client shall be cross-platform compatible. This will ensure that all binary files are stored in the host platform's native format.

- 4.1.2.6 The SNAS client shall provide programmatic access points to allow the MOC to develop external code to monitor User Performance Data (UPD)s and generate Ground Control Message Requests (GCMRs).
- 4.1.2.7 The SNAS shall allow customers to import Ground Control Message Requests (GCMRs).

4.1.3 Network Control Center Data System (NCCDS) Functions

4.1.3.1 Schedule Requests

4.1.3.1.1 General

The SNAS shall provide the customer with the capability to interface with the NCCDS as follows:

- 4.1.3.1.1.a The SNAS shall provide the customer with the capability to create the following types of schedule requests in an interactive, one-at-a-time mode:
 - 4.1.3.1.1.a.1 Schedule Add Request (SAR)
 - 4.1.3.1.1.a.2 Schedule Delete Request (SDR)
 - 4.1.3.1.1.a.3 Schedule Replace Request (RR)
 - 4.1.3.1.1.a.4 Alternate SAR (ASAR)
 - 4.1.3.1.1.a.5 Schedule Wait List Request (WLR)
- 4.1.3.1.1.b The SNAS shall provide the customer with the ability to maintain mission prototypes and patterns including:
 - 4.1.3.1.1.b.1 The SNAS shall allow the customer to create, store, retrieve, modify, and delete prototypes.
 - 4.1.3.1.1.b.2 The SNAS shall allow the customer to create, store, retrieve, modify, and delete patterns.
 - 4.1.3.1.1.b.3 The SNAS shall allow the customer to view a report of the schedule requests, identifying status and reason if not generated.
- 4.1.3.1.1.c The SNAS shall provide the customer with the capability to generate a series of SARs and associated ASARs controlled by a user-defined pattern containing schedule request prototypes that are based on TSW information..
- 4.1.3.1.1.d The SNAS shall provide the customer with the capability to generate a series of RRs controlled by a user-defined pattern containing schedule request prototypes that are based on confirmed events, TSW information, and TUT information.

- 4.1.3.1.1.e The SNAS shall provide the customer with the capability of accepting and processing externally generated (batch) schedule requests, including SARs, ASARs, RRs, SDRs, and WLRs. All of these message formats are defined in 452-ICD-SN/CSM.
- 4.1.3.1.1.f Based on the customer's login information, the SNAS shall provide the customer with the capability to select any combination of SICs to be used in the request from a list of SICs for which the customer is authorized.
- 4.1.3.1.1.g For each of these types of schedule requests, the SNAS shall provide the customer with the capability to interactively create a new request by copying and editing a previous request.
- 4.1.3.1.1.h Upon completion of the customer's entry or import of a request(s), the SNAS shall format and store the request(s).
- 4.1.3.1.1.i The SNAS shall provide the customer with the capability to select a stored individual schedule request or a stored group of schedule requests to transmit to the NCCDS.
- 4.1.3.1.1.j For each transmitted schedule request, the SNAS shall format the request in compliance with the applicable tables of 452-ICD-SN/CSM.
- 4.1.3.1.1.k For each of the supported schedule requests, the SNAS shall provide the customer with the capability to use all options specified for the type of request by the 452-ICD-SN/CSM.
- 4.1.3.1.1.l For each of these types of schedule requests, the SNAS shall format the request in compliance with the applicable tables of 452-ICD-SN/CSM.
- 4.1.3.1.2 **Schedule Add Request**
The following additional requirements apply to the entry and transmission of SARs:
- 4.1.3.1.2.a The SNAS shall provide the customer with the capability to create SARs at any time without regard to the relationship of the SAR and any previous schedule request.
- 4.1.3.1.2.b The SNAS shall allow the customer to specify a minimum duration value between the nominal service duration and one (1) minute for each service within the SAR, and prevent the customer from specifying a minimum duration value outside of this range.
- 4.1.3.1.2.c The SNAS shall allow the customer to specify priority levels for the NCCDS in scheduling support.
- 4.1.3.1.2.d The SNAS shall allow the customer to specify service start time plus and minus tolerances.

- 4.1.3.1.2.e The SNAS shall allow the customer to generate “coupled” services by setting a service whose start time is relative to that of a reference service.
- 4.1.3.1.2.f The SNAS shall allow the customer to generate “bound” services by ensuring that a service starts no earlier and stops no later than that of a reference service.
- 4.1.3.1.2.g The SNAS shall provide a bulk modify capability, allowing customers to change the following parameters for the SAR, and, optionally, any chained ASAR:
 - 4.1.3.1.2.g.1 A range of new start times using a delta time parameter
 - 4.1.3.1.2.g.2 TDRS or TDRS Set
 - 4.1.3.1.2.g.3 SUPIDEN or SIC
- 4.1.3.1.3 Schedule Delete Request
The following additional requirements apply to the entry and transmission of SDRs:
 - 4.1.3.1.3.a The SNAS shall ensure that each SDR contains a valid reference to an active event, or to a previously transmitted SAR, ASAR, or RR.
 - 4.1.3.1.3.b To facilitate this, the SNAS shall provide the customer with displays of the current active events and previously transmitted schedule requests.
- 4.1.3.1.4 Schedule Replace Request
The following additional requirements apply to the entry and transmission of RRs:
 - 4.1.3.1.4.a The SNAS shall ensure that each RR contains a valid reference to an event, or to a previously transmitted SAR, ASAR, or RR.
 - 4.1.3.1.4.b To facilitate this, the SNAS shall provide the customer with displays of the current active events and previously transmitted schedule requests.
 - 4.1.3.1.4.c When an untransmitted RR is modified, the SNAS shall replace the original request with the modified request.
 - 4.1.3.1.4.d The SNAS shall allow the customer to specify a minimum duration value between the nominal service duration and one (1) minute for each service within the RR, and prevent the customer from specifying a minimum duration value outside of this range.
 - 4.1.3.1.4.e The SNAS shall allow the customer to specify priority levels for the NCCDS in scheduling support.
 - 4.1.3.1.4.f The SNAS shall allow the customer to specify service start time plus and minus tolerances.

- 4.1.3.1.4.g The SNAS shall allow the customer to generate “coupled” services by setting a service whose start time is relative to that of a reference service.
- 4.1.3.1.4.h The SNAS shall allow the customer to generate “bound” services by ensuring that a service start no earlier and stops no later than that of a reference service.
- 4.1.3.1.5 **Alternate SAR (ASAR)**
The following additional requirements apply to the entry and transmission of ASARs:
- 4.1.3.1.5.a The SNAS shall ensure that each ASAR contains a valid reference to an event, or to a previously transmitted SAR, ASAR, or RR.
- 4.1.3.1.5.b To facilitate this, the SNAS shall provide the customer with displays of the current active events and previously transmitted schedule requests.
- 4.1.3.1.5.c The SNAS shall provide the customer with the capability to create ASARs at any time without regard to the relationship of the ASAR and any previous schedule request.
- 4.1.3.1.5.d The SNAS shall allow the customer to specify a minimum duration value between the nominal service duration and one (1) minute for each service within the ASAR, and prevent the customer from specifying a minimum duration value outside of this range.
- 4.1.3.1.5.e The SNAS shall allow the customer to specify priority levels for the NCCDS in scheduling support.
- 4.1.3.1.5.f The SNAS shall allow the customer to specify service start time plus and minus tolerances.
- 4.1.3.1.5.g The SNAS shall allow the customer to generate “coupled” services by setting a service whose start time is relative to that of a reference service.
- 4.1.3.1.5.h The SNAS shall allow the customer to generate “bound” services by ensuring that a service start no earlier and stops no later than that of a reference service.
- 4.1.3.1.6 **Schedule Wait List Request**
The following additional requirements apply to the entry and transmission of WLRs:
- 4.1.3.1.6.a The SNAS shall ensure that each WLR contains a valid reference to a previously transmitted SAR, ASAR, or RR and that the previously transmitted SAR, ASAR, or RR has been declined by the NCCDS, i.e., the NCCDS has transmitted an SRM with a result code of 02.

- 4.1.3.1.6.b To facilitate this, the SNAS shall provide the customer with displays of previously transmitted schedule requests that indicate whether the request has been declined by the NCCDS.
- 4.1.3.1.7 TDRS Scheduling Windows
- 4.1.3.1.7.a The SNAS shall provide the customer with the capability to automatically import files of TSWs into the SNAS for transmission to the NCCDS. These TSW files must be in a format compatible with the TSW message format specified by 452-ICD-SN/CSM.
- 4.1.3.1.7.b The SNAS shall provide the customer with the capability to manually import TSW files for transmission to the NCCDS.
- 4.1.3.1.7.c Based on the SIC within each selected file, the SNAS shall verify that the customer is authorized to send this TSW data to the NCCDS.
- 4.1.3.1.7.d For each validly selected file, the SNAS shall format the selected TSWs into one or more valid TSW messages, and transmit them to the NCCDS.
- 4.1.3.1.8 TDRSS Unscheduled Time
The SNAS shall retrieve current TDRSS Unscheduled Time (TUT) information from the NCCDS and store it so that it is accessible to Internet and Open IONet SNAS customers. The NCCDS allows all users of the Closed IONet to directly access TUT information; therefore the SNAS does not need to provide TUT information for Closed IONet SNAS customers.
- 4.1.3.2 Schedule Results
- 4.1.3.2.1 The SNAS shall provide the customer with capability to store in a file on the Client workstation the current active events and previously transmitted schedule requests.
- 4.1.3.2.2 Schedule Result Messages
Upon receipt of an SRM sent by the NCCDS, the SNAS shall:
- 4.1.3.2.2.a Notify the customer that the SRM has been received.
- 4.1.3.2.2.b Use the result and explanation codes from the SRM to update the status information for the request or event referenced by the SRM.
- 4.1.3.2.2.c Provide the customer with the capability to review the requests or events with the updated status information.
- 4.1.3.2.2.d If the event request is deleted by the customer or the operator, the appropriate annotation should be made.
- 4.1.3.2.3 User Schedule Messages
Upon receipt of an USM sent by the NCCDS, the SNAS shall:

- 4.1.3.2.3.a Notify the customer that the USM has been received.
 - 4.1.3.2.3.b Use the USM to update the SNAS's schedule.
- 4.1.3.3 Service Reconfiguration
- 4.1.3.3.1 General

The SNAS shall provide the customer with the capability to enter GCMRs and transmit them to the NCCDS as follows:

 - 4.1.3.3.1.a The SNAS shall provide the customer with the capability to enter the following types of GCMRs:
 - 4.1.3.3.1.a.1 User Reacquisition Request
 - 4.1.3.3.1.a.2 User Reconfiguration Request
 - 4.1.3.3.1.a.3 Forward Link Sweep Request
 - 4.1.3.3.1.a.4 Forward Link Effective Isotropic Radiated Power (EIRP) Reconfiguration Request
 - 4.1.3.3.1.a.5 Expanded User Frequency Uncertainty Request
 - 4.1.3.3.1.a.6 Doppler Compensation Inhibit Request
 - 4.1.3.3.1.b Based upon a customer's active event, the SNAS shall provide the customer with the capability to request a GCMR.
 - 4.1.3.3.1.c For each of these types of GCMRs, the SNAS shall provide the customer with capability to use all options specified for that type of request of 452-ICD-SN/CSM.
 - 4.1.3.3.1.d For each of these types of GCMRs, the SNAS shall format the GCMR in compliance with the applicable tables of 452-ICD-SN/CSM.
 - 4.1.3.3.1.e Upon completion of the customer's entry of a request, the SNAS shall transmit and store the request.
 - 4.1.3.3.2 Current Service Configuration Displays

The SNAS will provide the customer with the capability to review the configuration of each currently active service and to use this information in the entry of GCMRs as follows:

 - 4.1.3.3.2.a For each service type, the service configuration display shall provide detailed information at the individual service parameter level. This level of detail is comparable to that of the USM formats specified in 452-ICD-SN/CSM.

- 4.1.3.3.2.b As of service start time, the information in the service configuration display shall reflect the initial state of the service as specified in the applicable USM.
- 4.1.3.3.2.c Upon a successful service reconfiguration, the information in the service configuration display shall be updated to reflect the reconfigured parameter or parameters.
- 4.1.3.3.3 **GCM Status Message**
Upon receipt of a GCM Status Message, the SNAS shall:
 - 4.1.3.3.3.a Notify the customer that the GCM Status Message has been received, and show whether the status message indicates that a GCMR was rejected by the NCCDS, reflected by White Sands Complex (WSC), or accepted by WSC.
- 4.1.3.3.4 **GCM Disposition Message**
Upon receipt of a GCM Disposition Message, the SNAS shall notify the customer that the GCM Disposition Message has been received, and show whether the message indicates that a reconfiguration request was acknowledged or not acknowledged by WSC. Note: A GCM Disposition Message (indicating that WSC has failed to acknowledge a reconfiguration request), will be followed by a GCM Status Message (Indicating that the NCCDS has received no response from WSC).
- 4.1.3.4 **Performance Data Monitoring**
 - 4.1.3.4.1 **General**
In response to messages received from WSC, the NCCDS will transmit the following performance data messages to the SNAS:
 - 4.1.3.4.1.a UPD messages
 - 4.1.3.4.1.b Return Channel Time Delay (RCTD) messages
 - 4.1.3.4.1.c Time Transfer Messages (TTMs)
 - 4.1.3.4.1.d Acquisition Failure Notification (AFN) messages
 - 4.1.3.4.2 **User Performance Data Messages**
The SNAS will provide the following UPD message capabilities:
 - 4.1.3.4.2.a For each TDRS, the SNAS shall be capable of receiving one UPD message every five seconds for each SNAS customer with an active service on the TDRS.
 - 4.1.3.4.2.b SNAS shall make the information from the UPD message available for presentation to any logged-on Client machine(s) with permissions to the referenced SUPIDEN/SIC in real-time.

- 4.1.3.4.2.c The SNAS shall provide customers with the following capabilities and options for presentation of UPD message information:
 - 4.1.3.4.2.c.1 Dynamic updates as new messages are received
 - 4.1.3.4.2.c.2 Display of most recently received message
 - 4.1.3.4.2.c.3 Summary displays
- 4.1.3.4.3 Return Channel Time Delay Messages (RCTDM)
The SNAS will provide the following RCTDM capabilities:
 - 4.1.3.4.3.a Upon receipt of a RCTD message, the SNAS shall verify that it applies to a SUPIDEN for which there is a logged-in SNAS customer, and if so notify the customer of the receipt of the RCTD message.
 - 4.1.3.4.3.b The SNAS shall store the RCTD message in a file on the Client Workstation such that it is available for later processing by customer applications. Note: In general, RCTD messages will be received only when the return channel time delay option has been specified in a SN return service. Note2: A customer application for processing of RCTD data is not part of the SNAS product.
- 4.1.3.4.4 Time Transfer Messages (TTM)
The SNAS will provide the following TTM capabilities:
 - 4.1.3.4.4.a Upon receipt of a TTM, the SNAS shall verify that it applies to a SUPIDEN for which there is a logged-in SNAS customer, and if so, notify the customer of the receipt of the TTM.
 - 4.1.3.4.4.b The SNAS shall store the TTM in a file on the Client Workstation such that it is available for later processing by customer applications. Note: In general, TTM will be received only when the time transfer option has been specified in a SN tracking service. Note2: A customer application for processing of TTM data is not part of the SNAS product.
- 4.1.3.4.5 Acquisition Failure Notification (AFN) Messages
Upon receipt of an AFN, the SNAS shall verify that it applies to a SUPIDEN for which there is a logged-in SNAS customer, and if so, notify the customer of the receipt of the AFN. Note: AFN messages are generated by WSC upon failure to acquire a customer spacecraft at the scheduled start of a TDRSS return service.

4.1.4 DAS Functions

4.1.4.1 General

The SNAS provides SN customers with the capability to interface with the DAS to perform the following functions related to SN DAS services:

- 4.1.4.1.1 Service Planning
- 4.1.4.1.2 Service Allocation
- 4.1.4.1.3 Real-Time Operations
- 4.1.4.1.4 Service Performance Monitoring
- 4.1.4.1.5 Data Retrieval
- 4.1.4.1.6 Customer State Vector Updates
- 4.1.4.1.7 Receipt of DAS Alerts

4.1.4.2 Service Planning

The SNAS will provide the following DAS service planning capabilities:

- 4.1.4.2.1 The SNAS shall provide the customer with the capability to request a report on the resource allocations available to the customer.
- 4.1.4.2.2 Upon receipt of the response from the DAS, the SNAS shall notify the customer and make the response available for review.

4.1.4.3 Service Allocation

The SNAS will provide the following DAS service allocation capabilities:

- 4.1.4.3.1 The SNAS shall provide the customer with the capability to request the following:
 - 4.1.4.3.1.a Allocation of a specified resource
 - 4.1.4.3.1.b Deletion of a pending or ongoing resource allocation
 - 4.1.4.3.1.c Modification of a pending resource allocation
 - 4.1.4.3.1.d A list of all currently planned events for the customer
 - 4.1.4.3.1.e The details of a specified planned event
- 4.1.4.3.2 Upon receipt of the response from the DAS, the SNAS shall notify the customer and make the response available for review.

4.1.4.4 Real-Time Operations

The SNAS will provide the following DAS real-time operations capabilities:

4.1.4.4.1 The SNAS shall provide the customer with the capability to request the following:

4.1.4.4.1.a Reconfiguration of the values of a specified list of parameters for an ongoing service

4.1.4.4.1.b Reacquisition of the return service signal

4.1.4.4.2 Upon receipt of the response from the DAS, the SNAS shall notify the customer and make the response available for review.

4.1.4.5 Service Performance Monitoring

The SNAS will provide the following DAS performance monitoring capabilities:

4.1.4.5.1 If customer performance data was enabled, the SNAS shall provide this data to the customer as it is received from the DAS.

4.1.4.5.2 For each TDRS, the SNAS shall be capable for receiving one UPD message every sixty seconds for each SNAS customer with an active service on the TDRS.

4.1.4.5.3 Upon receipt of a UPD message, the SNAS shall verify that it applies to a SUPIDEN from which there is a logged-in SNAS customer, and if so, make the information from the UPD message available for presentation to that customer in real time.

4.1.4.5.4 The SNAS shall provide customers with the following capabilities and options for presentation of UPD message information:

4.1.4.5.4.a Dynamic updates as new messages are received

4.1.4.5.4.b Display of most recently received message

4.1.4.5.4.c Summary displays

4.1.4.6 Data Retrieval

The SNAS will provide the following DAS data retrieval capabilities:

4.1.4.6.1 The SNAS shall provide the customer with the capability to request the following:

4.1.4.6.1.a A search for archived data within a specified time window

- 4.1.4.6.1.b Playback of specific archived data
- 4.1.4.6.1.c Deletion of a previously playback request
- 4.1.4.6.1.d Modification of a previously playback request
- 4.1.4.6.2 Upon receipt of the response from the DAS, the SNAS shall notify the customer and make the response available for review.
- 4.1.4.7 DAS Alerts
 - 4.1.4.7.1 Upon receipt of a DAS alert, the SNAS shall alert the customer implied by the SIC specified in the DAS alert message and make the text of the DAS alert message available for review by the customer.
 - 4.1.4.7.2 If the DAS alert message does not apply to a specific user (i.e., SIC = "0000"), the SNAS shall alert all customers and make the text of the DAS alert message available for review by all customers.

4.1.5 Database

The SNAS database is connected to the closed side servers. Administrators will have direct access to the database through administrative management functions defined throughout this section. Note that customers do not have direct access to the database. Access granted to the customers is via the client interface. Additional functions provided to the customer are described throughout this requirements document in applicable sections.

- 4.1.5.1 The SNAS database shall provide features and administrator management capabilities including:
 - 4.1.5.1.1 Data entry, data deletion, data update, and data display.
 - 4.1.5.1.2 Create, modify, and display data forms and data reports.
 - 4.1.5.1.3 Make queries, examine data in either form, or file formats.
 - 4.1.5.1.4 Store both static and dynamic data.
 - 4.1.5.1.5 Import data from removable media.
 - 4.1.5.1.6 Export data to removable media.
 - 4.1.5.1.7 Backup the entire SNAS database.
 - 4.1.5.1.8 Restore the entire SNAS database.
- 4.1.5.2 SNAS shall allow customers to deposit and query data under the limited/indirect control of SNAS client software interface.

- 4.1.5.3 SNAS shall allow administrators full/direct control to deposit and query data on the SNAS servers.
- 4.1.5.4 SNAS shall automatically purge data based on criteria specified by SNAS administrative personnel.
- 4.1.5.5 SNAS shall delete data under the direct control of SNAS administrative personnel from the SNAS servers.
- 4.1.5.6 SNAS shall automatically synchronize to the NCCDS database.
- 4.1.5.7 SN Service Data
 - 4.1.5.7.1 The SNAS shall provide all data storage and retrieval capabilities necessary to support the requirements for SN services specified herein. This includes the capability to store and retain requests sent to the NCCDS and to the DAS.
 - 4.1.5.7.2 For each SIC, the SNAS shall partition data such that some of the data for that SIC can be entered, deleted, or modified only by authorized SNAS administrative personnel while the remainder of the data for that SIC can be entered, deleted, or modified by SNAS client users authorized for the SIC. In general, privileges related to entry, deletion, or modification of relatively static data will be restricted to authorized SNAS administrative personnel while privileges related to entry, deletion, or modification of time-dependent data such as schedule requests will be restricted to SNAS client users.
 - 4.1.5.7.3 The SNAS shall be capable of automatically purging data related to SN services based on criteria specified by authorized SNAS administrative personnel.
 - 4.1.5.7.4 The SNAS shall provide SNAS client users with the capability to access the contents of client log files containing data for which the user is authorized.
- 4.1.5.8 Customer Data
 - 4.1.5.8.1 For each SIC supported by the SNAS, the SNAS shall provide authorized SNAS administrative personnel with the capability to create and maintain all customer data necessary to interact with the NCCDS/DAS. In particular, this will include a set of SSCs, corresponding to the set maintained for the customer in the NCCDS database, defining the default service configurations for the SIC.
 - 4.1.5.8.2 For each SIC, the SNAS shall be capable of retaining a minimum of 10 SSCs.
 - 4.1.5.8.3 The SNAS shall maintain a list of valid SUPIDENs for each SIC.

- 4.1.5.8.4 The SNAS shall provide the customer with the capability to review and reference this data in the process of entering requests.
- 4.1.5.8.5 Customers designated as “Mission Manager” shall have the capability to edit SSCs assigned to that mission from the SNAS Client.

4.1.6 Logging Functions

- 4.1.6.1 The SNAS shall be capable of logging and delogging all of the following:
 - 4.1.6.1.1 Incoming external messages
 - 4.1.6.1.2 Outgoing external messages
 - 4.1.6.1.3 Alerts sent to SNAS clients
 - 4.1.6.1.4 Records pertaining to the establishment and termination of communications connections
 - 4.1.6.1.5 Records pertaining to SNAS system failures
 - 4.1.6.1.6 Records pertaining to SNAS database failures
 - 4.1.6.1.7 Records pertaining to successful SNAS login attempts
 - 4.1.6.1.8 Records pertaining to rejected SNAS login attempts
- 4.1.6.2 The SNAS shall provide SNAS administrative personnel with the capability to selectively control the logging and delogging of all of the above.
- 4.1.6.3 The SNAS shall provide SNAS client users with the capability to selectively control delogging of all of the above data for which the user is authorized.

4.2 PERFORMANCE REQUIREMENTS

4.2.1 System Requirements

- 4.2.1.1 The SNAS shall have the capability to store data for a minimum of 100 SIC platforms to include up to 250 clients.
- 4.2.1.2 The SNAS shall allow for one set of operational data and for at least one set of test data for each platform.
- 4.2.1.3 For any combination of Internet, Open IONet and Closed IONet SNAS clients, the SNAS servers shall be capable of supporting simultaneous connections from SNAS clients.

- 4.2.1.4 In general, actual SNAS response times depend on factors that are beyond the control of the SNAS product. The following response time requirements apply to the performance of the SNAS product, itself, and exclude delays due to factors such as IONet traffic volume and the performance of the SNAS client infrastructure. This limited set of response time requirements is intended only to characterize the overall performance of the SNAS, and not to provide a comprehensive set of response time requirements. Other specific interactions should have comparable response times.
- 4.2.1.4.1 For interactions initiated from the SNAS client that require a response from the NCCDS or DAS, the time from receipt of a client request to the time the request is issued to the NCCDS or DAS shall not exceed 10 seconds. (Closed server)..
- 4.2.1.4.2 For interactions initiated from the SNAS client that require simple retrieval of data from the SNAS database, the time from receipt of a client request to the time the request is issued to the NCCDS or DAS shall not exceed 10 seconds. Note: “Simple retrieval” applies to an action such as retrieving a single scheduled SN event. It does not apply to a complex action such as the retrieval of an entire schedule.

SECTION 5. INTERFACES

5.1 SNAS Client Workstation

For any combination of Internet, Open IONet and Closed IONet SNAS client users, the SNAS server shall be capable of supporting simultaneous connections with multiple SNAS clients. Note: The SNAS Client Workstation is not part of the SNAS product and is therefore regarded as an external interface requirement.

5.2 IONet Secure Gateway

5.2.1 Channel

All communications between the SNAS Open Server and the SNAS Closed Server shall be channeled through the IONet Secure Gateway.

5.2.2 Protocols

When in communication with each other, the SNAS Open Servers and the SNAS Closed Server shall not employ protocols or communications techniques that will be blocked by the IONet Secure Gateway.

5.2.3 Modifications

The SNAS shall not require the IONet Secure Gateway to modify its rule set in response to SNAS configuration changes, or in response to the addition or removal of SNAS customers.

5.3 Data Services Management Center

5.3.1 General

All communications between the SNAS and the NCCDS shall comply with the 452-ICD-SN/CSM. Note: 452-ICD-SN/CSM is primarily written as the specification for the interface between a single SN customer and the NCCDS. However, the SNAS is a multi-mission/user system and 452-ICD-SN/CSM must be interpreted accordingly. For example, message IDs generated by the SNAS do not necessarily have to be unique for the SNAS-NCCDS interface; however, message IDs generated by the SNAS must be unique for each SIC supported by the SNAS.

5.3.2 Operations

- 5.3.2.1 For any SNAS client at any time, the SNAS shall be capable of communicating with either the NCCDS located in the operational NCC environment or with the NCCDS located in the ANCC.
- 5.3.2.2 SNAS shall be capable of simultaneous communication with the operational NCCDS for some clients and with the ANCC's NCCDS for other clients.

5.3.3 Transmission Protocols

- 5.3.3.1 The SNAS shall employ hypertext transfer protocol (HTTP) to retrieve TDRSS Unscheduled Time (TUT) information from the NCCDS.
- 5.3.3.2 The SNAS shall employ Transmission Control Protocol/Internet Protocol (TCP/IP) for all other communications with the NCCDS. The SNAS will not use Nascom 4800 Bit Block (BB) protocol or File Transfer Protocol (FTP) for any of its communications with the NCCDS.

5.3.4 Communications Messages

- 5.3.4.1 As needed, the SNAS shall establish communications connections with NCCDS services (refer to Table 4-3 of 452-ICD-SN/CSM) and automatically transmit any messages needed to configure the services.
- 5.3.4.2 In particular, the SNAS shall automatically transmit:
 - 5.3.4.2.1 Schedule Result Request messages on the NCCDS Schedule Status service connection.
 - 5.3.4.2.2 User Performance Data Request messages on the NCCDS User Performance Data service connection.
- 5.3.4.3 For all applicable message formats and message format parameters, the SNAS shall exercise the "full support" customer options. The SNAS will not exercise the "baseline" customer options.
- 5.3.4.4 For all applicable message formats and message format parameters, the SNAS shall exercise the "normal user" and "shuttle" options.

5.4 Demand Access System

All communications between the SNAS and the DAS shall comply with 452-ICD-DAS/SNAS.

5.4.1 Operations

- 5.4.1.1 For any SNAS client at any time, the SNAS shall be capable of communicating with the DAS located in the operational WSC environment.

5.4.2 Transmission Protocols

- 5.4.2.1 The SNAS shall employ Transmission Control Protocol/Internet Protocol (TCP/IP) for all other communications with the DAS.

5.4.3 Communications Messages

- 5.4.3.1 As needed, the SNAS shall establish communications connections with DAS services and automatically transmit any messages needed to configure the services.
- 5.4.3.2 In particular, the SNAS shall automatically transmit:
 - 5.4.3.2.1 User Performance Data Request (message 400).

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SECTION 6. OPERATIONS AND MAINTENANCE

6.1 OPERATIONS

6.1.1 Continuous Service

The SNAS servers shall be capable of continuous unattended operation.

6.1.2 Uninterrupted Service

The SNAS servers shall be designed and configured such that routine system maintenance operations and routine system administrative functions can be executed without rendering the capabilities of the servers operationally unavailable to the SNAS clients.

6.1.3 Startup Time

The startup time for SNAS shall be less than or equal to 90 seconds.

6.1.4 Failover Time

The failover time for SNAS shall be no more than three minutes. Note that checks for failed processes occur every 10 seconds. Therefore, a failed process may go undetected for up to 10 seconds.

6.1.5 Operating Environment

6.1.5.1 The SNAS servers shall be capable of successful operation using the power available within the DSMC facility. Thus not requiring either a quantity or quality of electric power that exceeds the capabilities of the DSMC facility.

6.1.5.2 The SNAS servers shall be capable of successful operation within the ambient temperature and humidity ranges available within the NCC facility. Thus not requiring modification of either the temperature or humidity control capabilities of the DSMC facility.

6.1.6 Operational Convenience

All SNAS controls and displays shall be fully accessible during setup and normal operation.

6.2 RELIABILITY, MAINTAINABILITY, AND AVAILABILITY (RMA)

6.2.1 Reliability

- 6.2.1.1 The measure of reliability for the SNAS servers is the Mean Time Between Failures (MTBF). The MTBF is defined as the 10-year life cycle of a fully operational SNAS divided by the predicted number of failures. The MTBF is determined in accordance with MIL-HDBK-217, Reliability Prediction of Electronic Equipment.
- 6.2.1.2 The Parts Count Reliability prediction method of MIL-HDBK-217 shall be used in the initial stages of system design.
- 6.2.1.3 The reliability prediction method shall shift to the Parts Stress Analysis Prediction method, or other reliability modeling technique approved by NASA, at the time when a firm, detailed parts list is available.
- 6.2.1.4 The MTBFs of the SNAS servers shall be determined in accordance with MIL-HDBK-217, Reliability Prediction of Electronic Equipment.

6.2.2 Maintainability

- 6.2.2.1 The Mean Time to Repair (MTTR) is the quotient obtained by dividing the sum of the times to repair failures by the number of failures. Excluded from time to repair are the time to obtain parts, components, tools, or supplies not provisioned at the SNAS facility, the time for essential personnel not scheduled to be at the SNAS facility to be notified of the failure and to travel to the SNAS facility, and the time to develop and conjure software corrections.
- 6.2.2.2 The MTTR for the SNAS shall not exceed 60 minutes.

6.2.3 Availability

- 6.2.3.1 Inherent Availability (A_i) is the probability that a system or equipment, when used under stated conditions in an ideal support environment (i.e., using available tools, spares, and personnel) will operate within specifications at all times. It excludes preventive maintenance actions, logistics supply time, and administrative downtime and is expressed as: $A_i = \text{MTBF} / (\text{MTBF} + \text{MTTR})$.
- 6.2.3.2 The inherent availability of any individual SNAS server for any period of 10,000 hours shall be 0.9998.

- 6.2.3.3 The Operational Availability (Ao) of the SNAS servers is defined in terms of the availability of the SNAS Closed servers to the SNAS Open IONet clients excluding any times during which the SNAS Closed servers are unavailable due to failure of the Open IONet, the Closed IONet, or the IONet Secure Gateway.
- 6.2.3.4 SNAS operational availability for any period of 10000 hours interval shall be 0.9999. Redundant paths may be used in achieving this Ao.

6.3 SOFTWARE MAINTENANCE

6.3.1 Anomalies

The SNAS shall provide capability for personnel to be cognizant of anomalous software behavior.

6.3.2 Trouble Reports

The SNAS shall provide capability for personnel to initiate software trouble reports.

6.3.3 Upgrades

The SNAS shall provide capability for personnel to install vendor-supplied software fixes and upgrades.

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SECTION 7. SECURITY

7.1 DOCUMENTATION REQUIREMENTS

SNAS shall adhere to the following security requirements:

- NASA Procedural Requirements (NPR) 2810.1, Security of Information Technology – Mission (MSN) category of NASA information, August 1999
- IP Operational Network (IONet) Security Plan, 290-003, October 2000
- White Sands Complex (WSC) Data Services Management Center (DSMC) Security Plan, May 2002.
- IP Operational Network (IONet) Access Protection Policy and Requirements, 290-004
- Goddard Procedures and Guidelines (GPG) 2810.1, Security of Information Technology, April 2003.

7.2 SECURITY FEATURES

7.2.1 Security Model

- 7.2.1.1 The SNAS Security Model shall use a COTS toolkit, capable of performing a secure message protocol that is compatible with the Internet Protocol (e.g.. Secure Socket Layer (SSL)), for digital certificate management.
- 7.2.1.2 The toolkit shall be capable of performing certificate authentication between a certificate authority (CA), user certificate, and application certificates.
- 7.2.1.3 The SNAS Security Model shall provide a framework for:
 - 7.2.1.3.1 authentication,
 - 7.2.1.3.2 data privacy,
 - 7.2.1.3.3 data integrity, and
 - 7.2.1.3.4 non-repudiation of missions that use NASA's TDRSS services.

7.2.2 System Security

(See the Security Plan for Space Network Access System, 453-SP-SNAS, May 2003, for additional information):

- 7.2.2.1 The SNAS shall enforce client password length/constraints/change frequency as described in the Security Plan.
- 7.2.2.2 The SNAS shall restrict the number of failed login attempts as described in the Security Plan.
- 7.2.2.3 The SNAS shall provide a utility to manage passwords.
- 7.2.2.4 The SNAS shall create/maintain audit files on all SNAS subsystems to include both activity and error logging.
- 7.2.2.5 The SNAS shall provide for secure message exchange using encryption.
- 7.2.2.6 The SNAS shall log all formatted messages exchanged with the NCCDS and DAS.
- 7.2.2.7 The SNAS shall log all significant events and errors.
- 7.2.2.8 The SNAS shall provide the capability to allow system operators to view logs.

Abbreviations and Acronyms

AFN	Acquisition Failure Notification
Ai	Inherent Availability
ANCC	Auxiliary Network Control Center
Ao	Operational Availability
ASAR	Alternate Schedule Add Request
BB	Bit block
CA	Certificate Authority
CCB	Configuration Control Board
CCR	Configuration Change Request
CNE	Center Network Environment
COTS	Commercial-Off-The-Shelf
DAS	Demand Access System
DCN	Document Change Notice
DSMC	Data Services Management Center
EIRP	Effective Isotropic Radiated Power
FDF	Flight Dynamics Facility
FTP	File Transfer Protocol

GCM	Ground Control Message
GCMR	Ground Control Message Request
GSFC	Goddard Space Flight Center
GUI	Graphical User Interface
HA	High Availability
HP	Hewlett-Packard
HTTP	Hypertext Transfer Protocol
ICD	Interface Control Document
IIRV	Improved Inter-Range Vectors
IONet	Internet Protocol Operational Network
IP	Internet Protocol
MAR	Multiple Access Return
MOC	Mission Operations Center
MSN	Mission-Level Security
MSOCC	Multisatellite Operations Control Center
MTBF	Mean Time Between Failures
MTTR	Mean Time To Repair
N/A	Not Applicable
NASA	National Aeronautics and Space Administration

NCC	Network Control Center
NCCDS	Network Control Center Data System
NISN	NASA Integrated Services Network
NPR	NASA Procedural Requirements
RCTD	Return Channel Time Delay
RCTDM	Return Channel Time Delay Message
RMA	Reliability, Maintainability, and Availability
RR	Replace Request
SAR	Schedule Add Request
SDR	Schedule Delete Request
SIC	Spacecraft Identification Code
SN	Space Network
SNAS	SN Access System
SRD	System Requirements Document
SRM	Schedule Result Message
SSC	Service Specification Code
SSL	Secure Socket Layer
STDN	Spaceflight Tracking and Data Network
SWSI	Space Network Web Services Interface

SUPIDEN	Support Identifier
TBD	To-Be-Determined
TBS	To-Be-Supplied
TCP	Transmission Control Protocol
TCP/IP	Transmission Control Protocol/Internet Protocol
TCW	TDRS Communication Window
TDRS	Tracking and Data Relay Satellite
TDRSS	TDRS System
TSW	TDRS Scheduling Window
TTM	Time Transfer Message
TUT	TDRS Unscheduled Time
UPD	User Performance Data
UPS	User Planning System
USM	User Schedule Message
WLR	Wait List Request
WSC	White Sands Complex